AMENDMENT NO. 1 JULY 2021

TO

IS 12986 (PART 1) : 1990 BIOGAS PLANTS — GLASS FIBRE REINFORCED POLYESTER RESIN GAS HOLDERS — SPECIFICATION

PART 1 WITH STEEL FRAME

(*Page* 1, *clause* **2**) — Substitute the following for the existing clause:

‘2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

IS/ISO No.	*Title*
1998 : 1962	Methods of test for thermosetting synthetic resin bonded laminated sheets
6746 : 1994	Unsaturated polyester resin systems — Specification (*first revision*)
9478 : 1989	Family size bio-gas plant — Code of practice (*second revision*)
11273 : 1992	Woven roving fabrics of ‘E’ glass fibre — Specification (*first revision*)
11320 : 1997	Glass fibre rovings for the reinforcement of polyester and of epoxide resin systems — Specification (*first revision*)

IS/ISO No.	*Title*
11551 : 1996	Glass fibre chopped strand mat for the reinforcement of epoxy, phenolic and polyesterresin systems — Specification (*first revision*)
ISO 4892-1 : 2016	Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance
ISO 4892-2 : 2013	Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps’

(*Page* 1, *clause* **3.15**) — Substitute the following for the existing:

‘Biogas (biomethane) is primarily methane gas which is generated through an anaerobic digestion of organic wastes by micro organisms. It is a relatively simple and economical method to produce a fuel from waste. The waste could comprise agricultural and crop waste, human waste and animal waste (cow dung for instance). Biogas (biomethane) is an environment friendly, clean fuel. The raw biogas (biomethane) as obtained from the waste digesters comprises of methane (CH_4) as the main component (50 - 70 percent), and carbon dioxide (CO_2) (30 - 40 percent) with varying quantities of H_2S, moisture and some other gases in trace quantities. Its composition varies depending upon the substrates used. The raw biogas is processed and purified from the unwanted gases like CO_2, H_2S and moisture upto a certain required level.’

(*Page* 2, *clause* **3.16**) — Substitute the following for the existing:

‘This refers to bio-degradable material originating in land and aquatic environments, such as cow dung, night soil, other animal droppings, bird litter/ poultry waste, animal and bird parts (other than bones), agricultural residue, forest residue and any other biomass waste (solid and liquid) etc.’

(*Page* 2, *clause* **3.17**) — Substitute the following for the existing:

‘3.17 Anaerobic Digestion

The biological conversion process carried out by micro-organisms which convert bio-mass, in the absence of oxygen, to methane, and other gaseous matter that includes carbon dioxide, hydrogen sulfide, ammonia, hydrogen, water vapor, etc.

NOTE — Wherever ‘Anaerobic Fermentation’is appearing in this standard, shall be read as ‘anaerobic digestion’.’

(*Page* 2, *clause* **3.18**) — Substitute the following for the existing:

'The rated capacity of bio-gas plants is the approximate daily output of the gas in cubic metres which is produced by the bio-gas plant (*see* IS 9478) when fed with prescribed quantity of bio-mass.The reference of IS 9478 is only indicative, the biogas plant capacities may vary as per the design.

NOTE — The dimensions given in the Table 3 are only indictable for the plant sizes of 1-10 m^3 gas generation per day and it will be different for different capacity of the plant as provided by the manufacturer of the plant.'

(*Page* 2, *clause* **4.1a**) — Substitute 'IS 11551' *for* 'IS 11551 : 1986'

(*Page* 2, *clause* **4.1b**) — Substitute 'IS 11273' *for* 'IS 11273 : 1985'

(*Page* 2, *clause* **4.1c**) — Substitute 'IS 11320' *for* 'IS 11320 : 1985'

(*Page* 2, *clause* **4.2**) — Substitute the following for the existing paragraph:

'Isophthalic grade unsaturated polyster resin shall be used in the manufacture of the biogas holders. The properties of the resin shall conform to the values given in Table 1 and the methods of test shall comply with that given in IS 6746.The resin shall be UV stable, when checked as per ISO 4892-1 and ISO 4892-2.'

(*Page* 2, *Table* 1) — Substitute the following for the existing:

'Table 1 Typical properties of Isophthalic Unsaturated Polyester Resin'

(*Clause* 4.2)

Sl No. (1)	**Property** (2)	**Value** (3)	**Min/ Range/ Tolerance** (4)	**Method of Test** (5)
i)	Acid value (mg KOH/g)	10 to 20	—	IS 6746
ii)	Volatiles (in Percentage)	40	± 3 %	IS 6746
iii)	Relative density (25 / 25 °C)	1.11	± 0.01	IS 6746 '

(*Page* 2, *clause* **4.3,** *line* 1) — Substitute ‘Pigment of suitable color or colors’for ‘Black Pigment’.

(*Page* 2, *clause* **4.4**) — Add at the end of paragraph:

‘The gel coat on the outside exposed surface shall be UV stable when checked as per ISO 4892-1 and ISO 4892-2’

(*Page* 3, *clause* **5.1**) — Substitute ‘IS 9478’ *for* ‘IS 9478 : 1986’ and add following at the end of the paragraph:

> ‘NOTE — The dimensions given in the Table 3 are only indictable for the plant sizes of 1-10 m^3 gas generation per day and it will be different for different capacity of the plant as provided by the manufacturer of the plant.’

(*Page* 3, *clause* **5.2**) — Substitute the following for the existing:

‘The recommended overall dimension of gas holder as indicated in Fig. 1. The gas holder can be of any other dimension are per the agreement to between the purchaser and the manufacturer.’

(*Page* 4, *clause* **8.2.1**, *second sentence*) — Substitute the following for the existing:

‘The diameter of the gas outlet shall be in accordance with the details given in Fig 2 or Fig 3 of IS 9478 or as per design of the plant.’

(*Page* 4, *clause* **8.2.4**, *first sentence*) — Substitute the following for the existing:

‘Bolt, holes shall be drilled in the moulded flange for joining to the matching flange of the mild steel bend/stainless steel (304 grade) (illustrative mild steel/stainless steel bend details is given in Fig. 9B of IS 9478).’

(*Page* 4, *clause* **8.2.4**, *last sentence*) — Substitute the following for the existing:

‘The subsequent connection are outlined in **11.1** of IS 9478.’

(*Page* 6, *clause* **10.8**) — Substitute ‘IS 1998’ *for* ‘IS 1998 : 1962’

(*Page* 6, *clause* **10.9**) — Substitute 'IS 1998' *for* 'IS 1998 : 1962'

(*Page* 6, *clause* **10.10**) — Substitute 'IS 1998' *for* 'IS 1998 : 1962'

(*Page* 6, *clause* **10.11**) — Substitute the following for the existing

'The sample cut from moulded water gas holders (*see* **10.11.1**) shall be subjected to temperature variation test (*see* **10.11.2**).

10.11.1 *Size of Cut Piece Sample*

Size of sample to be cut in accordance with clause **10.1** shall be approximately 400 mm × 400 mm, to prepare test specimen for physical property and mechanical property evaluation (colour, surface defects, voids, pores and tensile, cross breaking strength, impact resistance). Sample shall be cut from top, middle and bottom of the gas holder walls.

10.11.2 *Conditioning Requirements (Like Duration, Temperature, Medium etc.)*

Increase the temperature from ambient to 60°C. Maintain that temperature for 8 h. After exposure of 8h at 60°C decrease the temperature up to -15°C and maintain for 8 h. Repeat the same parameter for every cycle. Number of cycle of exposure shall be 7.

10.11.3 *Duration of Test — One Cycle 16h.*

10.11.4 *Qualifying Criteria for Acceptance/Rejection*

After the test following criteria should be check for the acceptance/rejection of the sample.

a) On visual inspection, test specimen shall not show any permanent sign of cracking or crazing after completing the test cycles, and after the test there should not be any discoloration of the test specimen.

b) The mechanical strength of the samples after exposure of this test, shall not be less than 90 percent of original strength of sample before the temperature variation test.'

(MED 04)

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